Analysis of the value of a ewe in the WA sheep industry

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Executive Summary

The WA flock is at a historically low level, however, sheep profitability is at record highs so rebuilding the state flock is an industry priority. Minimising ewe losses is a necessary component of the flock rebuilding. As a result of the feed shortage and possible grain shortage with high prices likely due to demand for grain from the east coast, local farmers may be tempted to underfeed their ewes during the summer/autumn period. Awareness and good information regarding the cost of mis-managing ewe nutrition will help minimize this temptation.

Economic analysis carried out for the Lifetime Ewe Management package demonstrated that it was most profitable for farmers to join in CS 3 and lamb in CS 3 and not feed grain to gain condition. This recommendation was robust for the range of prices examined in 2011 and for a range of regions and a range of time of lambing. Prices have since increased to levels outside the range examined in the package, so the targets for CS during pregnancy may have changed.

To further inform farmers, consultants and the agribusiness sector of the importance of nutritional management of their ewe flock and to improve decision making around the commitment of funding for purchasing feed, this project has calculated the cost of increased ewe mortality.

Ewe mortality at lambing is closely correlated to ewe CS at lambing and ewes that have a poor recovery post-weaning in 2019 due to a shortage of feed will be at risk of elevated mortality at lambing in 2020 if CS slips during pregnancy.

The analysis was carried out using the MIDAS suite of wholefarm models. Two regional versions were used, and 2 times of lambing were evaluated in each region for the Merino-Merino flocks and just the earlier lambing for the flock mated to a terminal sire.

Three flock structures were evaluated for each region. Two were based on a self-replacing merino ewe flock mated to merino rams. The first, 'bag lamb', was selling wether lambs into the air freight market and the second, 'export hogget', was selling wether hoggets into the live export market. The third flock structure, '1st cross lamb', was a merino ewe flock mated to a terminal sire with all progeny sold as finished lambs and ewe replacements bought in. The merino genotype evaluated in the analyses was a medium-fine merino, with reproduction based on the WA flock average.

The price scenario was based on output prices received in WA for the last 12 months with sensitivity analysis +/- 25% of the standard levels.

The results reinforce that the ewe is the powerhouse of the sheep enterprise and maintaining the productive base of the sheep flock in the current market conditions is highly profitable. Increased ewe mortality in the average WA flock reduces profitability by an average of $280 for M-M and $320 for M-TS per ewe lost. These results are based on current prices and the expectation that extra losses are likely to occur from the twin bearing ewes because these tend to be lower CS at lambing (unless scanned and differentially fed in late pregnancy). For the M-M ewes there is little difference in the value associated with variation in flock structure. In the flock selling 'bag lamb' an average ewe is $5/hd more valuable and a twin ewe is $8/hd more valuable than in the 'export hogget' flock.

There is little variation in value of ewes lost between regions, time of lambing, flock structure or wool price. However, there is variation between dry, single and twin bearing ewes, and variation due to meat prices. Twin bearing ewes are $60/hd more valuable than single bearing ewes and varying meat price up or down by 25% changes ewe value by approximately $55/hd.

The cost of increasing ewe deaths is the equivalent of the benefit of increasing ewe survival and these values represent the amount that could be spent on a ewe to prevent mortality. However, in practice it is only possible to target interventions to an 'at risk' group and therefore the breakeven expenditure for the group of ewes is the 'value per ewe' multiplied by the expected reduction in mortality. If the intervention is extra feeding, then there will be associated increases in production and these need to be quantified when determining profitability of the intervention.

Calculations were carried out to examine feeding levels during pregnancy. Scenarios were examined for ewes with varying condition score at joining and compared losing, maintaining and gaining condition during pregnancy. In all scenarios examined it was more profitable to maintain condition than allow the ewes to lose condition during pregnancy. The value ranged from $5 per ewe for single bearing ewes in CS 3 at joining up to $22.60 for a twin bearing ewe in CS 2 at joining. For single bearing ewes in CS 3 this is an 83% return on funds invested in supplementary feed and for the twin bearing ewes in CS 2 it is a 375% return on the funds.

Gaining condition during pregnancy increased profit above that achieved from maintaining the ewes if single bearing ewes were in CS 2 or for twin bearing ewes in any condition score. For single bearing ewes in CS 2 gaining 0.5 CS increased profit by $1.70, which is a 10% return on the funds invested in the extra supplementary feed. Feeding the twin bearing ewes in CS 2 to gain weight increased profit by $10.70 per ewe which is a 60% return on funds invested.

These results give confidence to farmers and financiers that it is a profitable investment to feed all ewes to maintain condition during pregnancy and to feed low condition score single bearing ewes and low & medium condition score twin bearing ewes to gain condition.

Furthermore, there is also a non-financial benefit associated with reducing ewe mortality, associated with animal welfare and farmer stress levels. These factors have not been included in this analysis but are relevant non-financial goals for farmers and society.

Background

The WA flock is at a historically low level, however, sheep profitability is at record highs so rebuilding the state flock is an industry priority. Minimising ewe losses is a necessary component of the flock rebuilding, however, the 2019 seasonal conditions have been difficult with a possibility of a failed spring based on the BOM forecast for September to December rainfall. As a result of the feed shortage and possible grain shortage with high prices likely due to demand for grain from the east coast, local farmers may be tempted to underfeed their ewes during the summer/autumn period. Awareness and good information regarding the cost of mis-managing ewe nutrition will help minimize this temptation.

Economic analysis carried out for the Lifetime Ewe Management package (LTEM) demonstrated that it was most profitable for farmers to manage for and achieve LW targets during the pregnancy period (Young *et al.* 2011). The targets adopted were joining in CS 3 and lambing in CS 3, this recommendation was robust for the range of prices examined in 2011 and for a range of regions and a range of time of lambing. Subsequent analysis carried out for the More Lambs More Often training course (MLMO) reinforced that achieving the LW targets increased profits both in good seasons and in the poor seasons. However, this finding is not as widely known in the farming community because the reach of MLMO has been more limited than LTEM. Furthermore, prices have increased to levels outside the range examined by Young *et al.* (2011), so the targets for CS during pregnancy may have changed.

An important finding of both analyses was that it seldom pays for ewes to gain weight from feeding grain. The most profitable strategy is to use the grain feeding to limit LW loss and use green feed to gain weight. This is due to the higher efficiency of use of energy for maintenance than for LW gain.

To further inform farmers, consultants and the agribusiness sector of the importance of nutritional management of their ewe flock and to improve decision making around the commitment of funding for purchasing feed this project has calculated the cost of increased ewe mortality. These values will provide motivation for producers to improve nutritional management and provide financial justification for adequate nutrition.

Findings from the Lifetimewool research project that are reported in the Lifetime Ewe Management package showed that ewe mortality at lambing was closely correlated to ewe CS at lambing (Figure 2). Ewes that have a poor recovery post-weaning in 2019 due to a shortage of feed will be at risk of elevated mortality at lambing in 2020 if CS slips during pregnancy.

Improving ewe survival impacts farm profitability through

1. Increasing income generated by the ewe flock because more of the ewes on hand at the start of the year are shorn and either don't require replacing at the end of the year or can be sold.
2. Increasing the number of lambs weaned per ewe joined because the extra ewes surviving can raise their lambs.
3. The extra feed requirement for the extra ewes and the extra lambs surviving. The cost of providing the feed depend son the time of lambing relative to the break of season (the main feed shortage for the year). There is likely to be a trade-off between the extra cost of providing the feed for the extra lactating ewes – this cost will be lower for spring lambing flocks – with the cost of providing the extra feed post-weaning for the extra lambs that survive – this cost will be lower for autumn lambing flocks.

4. If they are multiple bearing ewes that are surviving, then a greater proportion of the offspring that become replacements for the ewe flock will be multiple born, and multiple born lambs have lower wool production value for their lifetime.
5. There is also a non-financial benefit associated with reducing ewe mortality, associated with animal welfare and farmer stress levels. These factors have not been included in this analysis but are relevant non-financial goals for farmers and society.

Method

The analysis was carried out using the MIDAS suite of wholefarm models (Kingwell & Pannell 1987). MIDAS is a suitable framework for the analysis because it accounts for the value of improved ewe survival through the impact on:

i. the extra income earned from requiring fewer replacement ewes and from having extra older ewes available for sale
ii. the extra lambs that are likely to survive because the ewe survived
iii. the age structure of the flock
iv. the feed requirement of the flock through the year resulting from extra ewe and lamb survival

Two regional versions were used, and 2 times of lambing were evaluated in each region for the Merino-Merino flocks and just the earlier lambing for the flock mated to a terminal sire.

Region 1: Great Southern. Lambing in May & late July
Region 2: Central Wheatbelt. Lambing in May & mid July.

The resources available on each farm are outlined in Table 1.

Table 1: Resources available on each of the farms analysed

		Great Southern	Central Wheatbelt
Area	ha	2130	3750
Crop Yields			
Cereal	t/ha	3.9	2.1
Canola	t/ha	1.9	1.0
Lupin	t/ha	-	1.3
Pasture Growth	t/ha	6.0	3.3

Flock Structure

Three flock structures were evaluated for each region. Two were based on a self-replacing merino ewe flock mated to merino rams, the first, 'bag lamb', was selling wether lambs into the air freight market with a carcass weight of approximately 16kg and the second, 'export hogget', was selling wether hoggets off-shears to the live export trade at 50kg. For both flocks, surplus young ewes were sold as ewe hoggets and cast-for-age ewes were sold at 5.5 years after 4 lambing opportunities. The third flock structure, '1st cross lamb', was a merino ewe flock mated to a terminal sire with all progeny sold as finished lambs. Replacement merino ewes were purchased as hoggets and sold after 5 lambing opportunities at 6.5 years. Only lambing in autumn was evaluated and the lambs were turned off prior to pasture senescence as a sucker lamb.

Genotype

The merino genotype evaluated in the analysis (Table 2) was a medium-fine merino, with reproduction based on the WA flock average (Curnow & Conte 2019).

Table 2: Standard productivity of the genotype used in this analysis. Note: there is some variation around the specified values depending on the nutrition profile of the ewes.

	Merino-Merino	Merino-Terminal
Ewe CFW	3.2 kg	3.3kg
FD	19.8u	20.0
NLW	90%	95%
Wean age[1]	10 wks	17 wks

1. Age of the youngest animal at weaning

Prices

The price scenario was based on output prices received in WA for the last 12 months (Table 3). Sensitivity analysis was carried out at +/- 25% of the standard levels, the meat prices were varied together with the same percentage adjustment and the wool prices were varied together with the same percentage adjustment.

Table 3: Standard price scenario used in this analysis.

Meat	Lamb ($/kg DW)	$6.50
	CFA ewes ($/kg DW)	$4.20
	Export hoggets ($/hd)	$120
Wool	19µ ($/kg clean fleece)	$21.80
	20 µ ($/kg clean fleece)	$21.20
	21 µ ($/kg clean fleece)	$21.00

Analysis

The analysis compared the profitability of a flock with higher mortality with a flock with lower mortality. The driver of the difference in mortality was not included in the analysis, so the cost of any intervention required to reduce mortality needs to be paid for by the estimated increase in profit.

The variation in mortality was valued assuming that it occurred at lambing because this is the most likely time point for mortality of reproducing ewes. When ewe mortality at lambing was changed the death of the ewe results in the death of the lambs she is carrying and the loss of any wool she has grown. Mortality at lambing was increased by 1% for all age groups of ewes and the reduction in profit was divided by the number of extra ewes dying. The reduction in profit from increasing mortality of dry, single and twin bearing ewes independently was estimated to quantify the benefits of improving ewe survival for ewes with different pregnancy status and litter size.

The variation in the cost of providing the extra feed required for the extra ewes and lambs was calculated for farms with varying levels of grazing pressure (+/- 30%). Varying the number of stock (without altering the feed supply) changes the amount and quality of the surplus pasture available and this alters the cost of providing the extra feed for the ewes and lambs. Constraints on the amount of dry pasture and stubble that must be retained at the break of the next season to minimize erosion were not altered and this limits the utilization of pasture and increases the requirement for supplementary feeding in the high stocking rate scenarios.

Results & Discussion

The standard farms

1st cross lamb production is the most profitable flock structure in the Great Southern and equal most profitable in the central wheatbelt. ‘Bag lamb’ was more profitable than ‘export hogget’ if lambing in May, but ‘export hogget; was more profitable if lambing in July (Table 4 & Table 5). In both regions stocking rate was higher and supplementary was lower when lambing in July compared with May.

Table 4: Profit and productivity of each scenario with optimum management with standard mortality levels for the Great Southern farm.

		May lambing			July lambing	
		Bag lamb	Export hgt	1st cross	Bag lamb	Export hgt
Profit	$/farm/yr	615 600	587 400	685 100	617 100	631 400
	$/ha/yr	289	275	326	290	296
Crop Area	%	50	50	50	50	50
Stocking Rate	DSE/ha	8.9	9.1	8.3	9.4	10.0
Proportion Ewes	%	80	66	100	80	66
Supp feeding	t	310	310	385	222	144
	DSE/ha	32.6	31.9	43.3	22.2	13.5

Table 5: Profit and productivity of each scenario with optimum management with standard mortality levels for the central wheatbelt farm.

		May lambing			July lambing	
		Bag lamb	Export hgt	1st cross	Bag lamb	Export hgt
Profit	$/farm/yr	244 900	233 600	350 300	347 400	352 300
	$/ha/yr	65.30	62.30	93.40	92.60	93.45
Crop Area	%	80	80	80	80	80
Stocking Rate	DSE/ha	4.6	4.8	5.4	8.1	9.6
Proportion Ewes	%	80	66	100	80	66
Supp feeding	t	163	160	303	158	181
	DSE/ha	29.5	27.6	47.0	25.8	25.2

Cost of ewe mortality

The cost of losing an average unscanned merino ewe mated to a merino ram (M-M) is $236/hd averaged across region and time of lambing and a merino ewe mated to a terminal sire (M-TS) is $298/hd. This value is comprised of the value of the ewe surviving ~$100/hd net on farm, the value of the wool shorn $55/hd and the value of the extra lambs ($76 each for twins and $93.50 for singles) minus the cost of feeding.

Twin bearing ewes are more valuable, a twin M-M is worth $280/hd and a twin M-TS is $320/hd. For the M-M ewes there is little difference in the value associated with variation in flock structure. In the flock selling ‘bag lamb’ an average ewe is $5/hd more valuable and a twin ewe is $8/hd more valuable than in the ‘export hogget’ flock.

Region and Time of Lambing

Time of lambing affects the cost of ewe mortality through the trade-off between the cost of providing the feed for the extra ewes & the feed for the extra lambs surviving lambing. With an autumn lambing the animals that die at lambing don’t need to be fed through the feed shortage at the break of the season, however, the value of the feed saved from having fewer lambs to feed prior to sale is less because of the longer period of high-quality green feed available post-weaning.

On balance, time of lambing has a small impact on the cost of increased mortality (Table 6), with ewes lambing in May being between $3/hd and $39/hd more valuable than ewes lambing in July. This indicates that the higher value of the feed through the break of the season is more than offset by the value of the extra green feed for the lamb.

Note: This result, that autumn lambing ewes are more valuable should not be confused with the profitability of autumn and spring lambing. The value of the ewe is a ‘per head’ calculation whereas profitability is a ‘per hectare’ calculation and includes stocking rate.

Table 6: Cost of increasing twin ewe mortality ($/ewe death) for the 2 regions evaluated and both times of lambing for the flock types.

Region	Flock	Autumn	Spring
Great Southern	Bag lamb	280	258
	Export Hogget	260	257
	1st cross lamb	322	-
Cereal sheep zone	Bag lamb	318	282
	Export hogget	309	280
	1st cross lamb	319	-

Pregnancy status & litter size

Twin bearing ewes are approximately $60/hd (range $50 - $76/hd) more valuable than single bearing ewes, which are approximately $60/hd (range $50 - $72/hd) more valuable than dry ewes (Table 7). An average value across the 3 flock types and the 2 times of lambing was an extra M-M twin ewe surviving would increase profit by $280/ewe and an extra twin M-TS $320/ewe.

Table 7: Impact of pregnancy status and litter size on the cost of increased mortality for a flock in the Great Southern selling export wether hoggets.

Region	Status / litter size	Autumn	Spring
Great Southern	Dry	141	157
	Single	196	207
	Twin	260	257
Cereal sheep zone	Dry	161	167
	Single	233	222
	Twin	309	280

Stocking Rate

Increasing stocking rate reduces the cost of higher ewe mortality (Figure 1) because feed is more valuable when stocking rate is higher. The low sensitivity to stocking rate in the central wheatbelt in autumn is thought to be an anomaly. It results from the low stocking rate in the scenario and an interaction with the constraint added to the model to ensure the total grain feeding levels are realistic. This result has been discounted in subsequent discussions.

On average a 10% increase in stocking rate reduces the cost of increased mortality by 4.5%, or doubling the stocking rate reduces the cost by 20-25%. The proportional changes are consistent across dry, single and twin bearing ewes and relates to $65/hd, $50/hd and $35/hd for twins, singles and dry ewes if stocking rate is doubled or seasonal conditions result in halving of dry matter production with no change in stocking rate. The dollar value is higher for twins because they have the highest energy requirements and lower for singles and drys due to lower energy requirements.

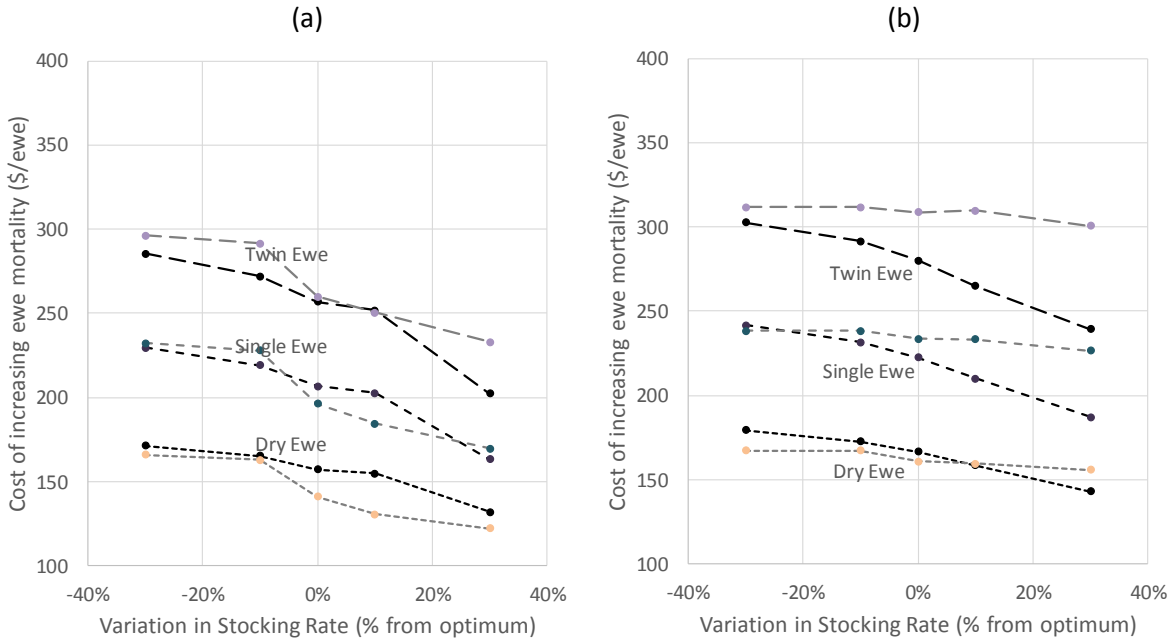

Figure 1: Cost of increased ewe mortality reduces with increasing grazing pressure and increases with increasing litter size. Result for July lambing flock (black line) and May lambing flock (grey line) in the (a) Great Southern and (b) central wheatbelt, both selling export wether hoggets.

Prices

The value of an extra ewe is more sensitive to meat price than wool price (Table 8). A 25% change in meat price results in approximately a 20% change in the value of a ewe, whereas, a 25% change in wool price is only a 5% change in the value of a ewe. These results are consistent with the findings from the analysis on the value of extra lambs that showed the value of an extra lamb is much more sensitive to meat price than wool price (Young *et al.* 2014).

Table 8: Impact of prices on the cost of increased twin bearing ewe mortality for flocks selling export wether hoggets.

Region	Price scenario	Autumn	Spring
Great Southern	High meat	311	310
	High wool	270	273
	Standard	260	257
	Low wool	253	243
	Low meat	208	206
Cereal sheep zone	High meat	373	335
	High wool	305	294
	Standard	309	280
	Low wool	288	267
	Low meat	246	225

Conclusions

These results reinforce that the ewe is the powerhouse of the sheep enterprise and maintaining the productive base of the sheep flock in the current market conditions is highly profitable. Increased ewe mortality in the average WA flock reduces profitability by an average of $280 for M-M and $320 for M-TS per ewe lost. These results are based on current prices and the expectation that extra losses are likely to occur from the twin bearing ewes because these tend to be lower CS at lambing (unless scanned and differentially fed in late pregnancy).

There is little variation in value of the ewe lost between regions, time of lambing, flock structure or wool price. However, there is variation between dry, single and twin bearing ewes, and variation due

to meat prices. Twin bearing ewes are $60/hd more valuable than single bearing ewes and varying meat price up or down by 25% changes ewe value by approximately $55/hd.

The cost of increasing ewe deaths is the equivalent of the benefit of increasing ewe survival and these values represent the amount that could be spent on a ewe to prevent mortality. However, in practice it is only possible to target interventions to an 'at risk' group and therefore the breakeven expenditure for the group of ewes is the value per ewe multiplied by the expected reduction in mortality. If the intervention is extra feeding, then there will be associated increases in production and these need to be quantified when determining profitability of the intervention.

Further Calculations with these Values

An impact of a dry spring, as being experienced in 2019, is the increase in digestibility of the senesced dry feed over summer. This leads to good animal performance during early summer due to higher intake and higher metabolizable energy content. However, this may give a false sense of confidence in the feed supply which can lead to unexpected LW loss and a potential erosion risk if paddocks become over grazed due to high animal intake. These risks are heightened if there is subsequent summer rainfall after the dry spring.

If ewes lose weight as a result of lack of dry summer feed then this will increase ewe mortality at lambing and increase lamb mortality due to low birth weight. Calculations have been carried out to examine the benefit of improving the feeding of ewes during pregnancy using the values and relationships reported in the Lifetime Ewe Management package.

Background Data

Ewe survival at lambing and ewe CS

Ewes in lower CS at lambing have higher mortality and LTW quantified this relationship for mobs of both single and twin bearing merino ewes (Figure 2). The 2 lines are parallel with the twins being 2.3% higher than the single ewes.

A reduction of 0.5CS from CS3.5 increases mortality by 0.4%, reducing from CS3 increases mortality by 0.9%, from CS2.5 increases mortality by 1.8% and from CS2 a 0.5CS reduction increases mortality by 3.5%.

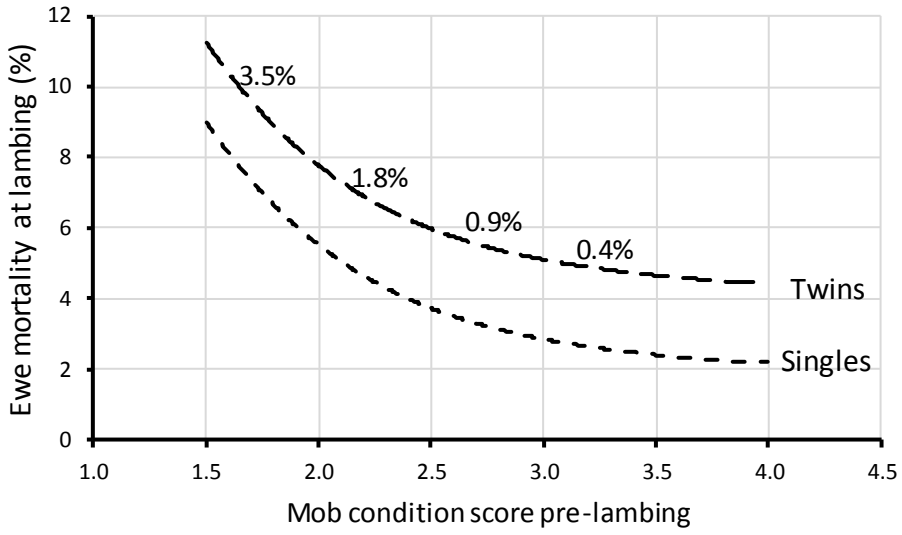

Figure 2: Relationship between mob average ewe CS at lambing and mortality for single and twin bearing ewes. Values in body of the graph are the change in mortality if ewe CS changes by 0.5 CS.

Lamb survival and ewe CS

Ewes in lower CS at lambing have lighter lambs and lighter lambs have lower survival (Figure 3). Increasing the lambing CS of twin ewes from 2.5 to 3 increases twin lamb survival by 9.6%. Part of this increase in lamb survival is associated with the increase in ewe survival. Therefore, using this increase in lamb survival and the value of ewe survival calculated in this report would double count the value of the lambs surviving due to the increased ewe survival. To remove this double counting the change in survival of the lambs from the ewes surviving has been calculated (Table 9). These values are lower than the change in lamb survival measured and have been used in the calculation of the impact of extra feeding during pregnancy.

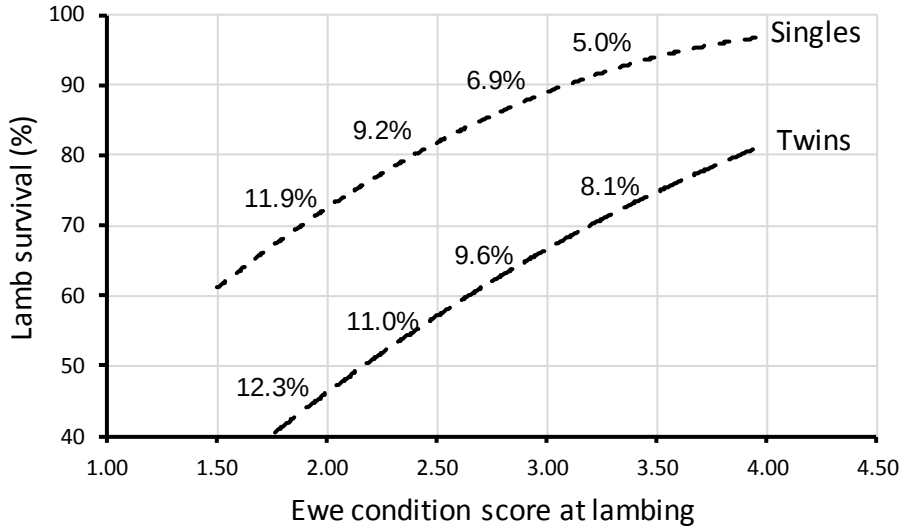

Figure 3: Relationship between mob average ewe CS at lambing and survival of single and twin born lambs. Values in body of the graph are the change in survival if ewe CS changes by 0.5 CS.

Table 9: Change in lamb survival for the ewes surviving. Formula = $\frac{Lamb\ survival_2}{Ewe\ survival_2} - \frac{Lamb\ survival_1}{Ewe\ surivial_1}$

Lambing CS scenario	Singles	Twins
CS 2 – CS 1.5	10.1%	11.8%
CS 2.5 – CS 2	8.1%	10.7%
CS 3 – CS 2.5	6.4%	9.5%
CS 3.5 – CS 3	4.7%	8.2%

Feeding rates rules of thumb

Rules of thumb for the amount of supplementary feed required when feeding ewes grazing on dry pasture were developed for LTEM are in Table 10.

Table 10: Rules of thumbs regarding supplementary feeding levels for ewes grazing dry pasture.

Scenario		Supplement required
Ewes losing weight	Reduce LW loss by 1 kg	3 kg
Ewes maintaining weight	Gain 1 kg of LW	8 – 9 kg

Value of an extra lamb

Young *et al.* (2014) estimated the value of extra lambs surviving birth, these values have been extrapolated to current prices (Table 11). These values will be updated in an analysis planned in early 2020 funded by AWI & MLA. They account for the increased energy requirement of the ewe during lactation, the energy requirement of the lamb from weaning till it is sold and the difference in future productivity of single and twin born lambs.

Table 11: Value of an extra merino lamb surviving birth. Source: Young et al. 2014.

	Lamb Price ($/kg DW)			
	$5	$6	$7	$8
Single Lamb	75	93.75	112.5	131.25
Twin Lamb	56	70	84	98

Ewe targets during pregnancy

These calculations examine the impact of increasing the feeding of ewes during pregnancy. Scenarios were examined for ewes with varying CS at joining. The base case was assuming ewes would lose 0.5 CS during pregnancy and this was compared with maintaining weight or gaining 0.5 CS during pregnancy.

The change in feeding level and the change in productivity are outlined in Table 12 and the financial impacts of these changes are in Table 13. In all scenarios examined it was more profitable to maintain condition than allow the ewes to lose condition during pregnancy (Table 13). The value ranged from $5 per ewe for single bearing ewes in CS 3 at joining, up to $22.60 for a twin bearing ewe in CS 2 at joining. For single bearing ewes in CS 3 this is an 83% return on funds invested in supplementary feed and for the twin bearing ewes in CS 2 it is a 375% return on the funds.

Gaining condition during pregnancy increased profit above that achieved from maintaining the ewes if single bearing ewes were in CS 2 or for twin bearing ewes in any condition score. For single bearing ewes in CS 2 gaining 0.5 CS increased profit by $1.70, which is a 10% return on the funds invested in the extra supplementary feed. Feeding the twin bearing ewes in CS 2 to gain weight increased profit by $10.70 per ewe which is a 60% return on funds invested. Feeding twin bearing ewes in CS 3 to gain weight during pregnancy has a return of 17% on funds invested.

These results give confidence to farmers and financiers that it is a profitable investment to feed all ewes to maintain condition during pregnancy and to feed low condition score single bearing ewes and low & medium condition score twin bearing ewes to gain condition.

Table 12: Change in production and feeding levels for the scenarios tested for ewe nutrition during pregnancy. Production levels estimated from Lifetime Ewe Management package (as outlined in Background Data above).

Joining	Ewe CS change	Lambing	Grain required (kg consumed)	Ewe survival (%)	Lamb survival[2] Single (%)	Lamb survival[2] Twin (%)	Ewe wool[3] CFW (kg)	Ewe wool[3] FD (μ)
2.0	0	2.0	15	+3.5%	10.1%	11.8%	+0.16	+0.4
	+0.5	2.5	60	+5.3%	18.2%	22.6%	+0.66	+1.5
2.5	0	2.5	15	+1.8%	8.1%	10.7%	+0.16	+0.4
	+0.5	3.0	60	+2.7%	14.5%	20.2%	+0.66	+1.5
3.0	0	3.0	15	+0.9%	6.4%	9.5%	+0.16	+0.4
	+0.5	3.5	60	+1.3%	11.1%	17.7%	+0.66	+1.5

2. Increase in survival of lambs from ewes surviving – so as not to double count the value of the lambs that survive because their dam survives.

3. Wool based on growth (g per MJ of feed consumed) as reported in SCA (1990)

Table 13: Financial outcome from feeding ewes for the scenario outlined compared with the ewes losing 0.5 CS during pregnancy. Production assumptions are in Table 12. All values are differences in income or costs compared with ewes losing 0.5 CS during pregnancy.

Joining	Ewe CS Change	Lambing	Singles & Twins Grain	Singles & Twins Wool	Value for singles Ewes	Value for singles Lambs	Value for singles **Total**	Value for twins Ewes	Value for twins Lambs	Value for twins **Total**
2.0	0	2.0	-$6	$2.50	$7.60	$8.40	**$12.40**	$9.80	$16.30	**$22.60**
	+0.5	2.5	-$24	$10	$11.50	$16.70	**$14.10**	$14.80	$32.60	**$33.30**
2.5	0	2.5	-$6	$2.50	$3.90	$8.40	**$8.70**	$5.00	$16.30	**$17.80**
	+0.5	3.0	-$24	$10	$5.80	$14.90	**$6.70**	$7.50	$30.70	**$24.20**
3.0	0	3.0	-$6	$2.50	$1.90	$6.60	**$5.00**	$2.50	$14.40	**$13.40**
	+0.5	3.5	-$24	$10	$2.90	$11.40	**$0.20**	$3.70	$26.90	**$16.50**

Future analysis ideas

An extension of the idea evaluated in this analysis is to quantify what a farmer can afford to pay for ewes if they are rebuilding their flock. This could compare alternative rebuilding strategies

i. Buy in
ii. Breed
iii. Retain wethers
iv. Don't bother and go cropping

References

Curnow M &Conte J (2019) Western Australian Sheep Producer Survey 2018. Department of Primary Industries and Regional Development, May 2019.

Ferguson MB, Thompson AN, Gordon DJ, Hyder MW, Kearney GA, Oldham CM, Paganoni BL (2011) The wool production and reproduction of Merino ewes can be predicted from changes in liveweight during pregnancy and lactation. *Animal Production Science* **51**, 763–775. doi:10.1071/AN10158

Oldham CM, Thompson AN, Ferguson MB, Gordon DJ, Kearney GA, Paganoni BL (2011) The birthweight and survival of Merino lambs can be predicted from the profile of liveweight change of their mothers during pregnancy. *Animal Production Science* **51**, 776–783. doi:10.1071/AN10155

Standing Committee on Agriculture (1990) 'Feed standards for Australian Livestock – ruminants.' (CSIRO Publishing: Melbourne)

Young JM, Thompson AN, Oldham CM, Curnow M (2011) Whole-farm profit and the optimum maternal liveweight profile of Merino ewe flocks lambing in winter and spring are influenced by the effects of ewe nutrition on the progeny's survival and lifetime wool production. *Animal Production Science* **51**, 821–833. doi:10.1071/AN10078

Young JM, Trompf J, Thompson AN (2014) The critical control points for increasing reproductive performance can be used to inform research priorities. *Animal Production Science* **54**, 645–655. doi: 10.1071/AN13269

Appendix of detailed results

Great Southern

Table 14: Value of an extra dry, single or twin ewe surviving for 5 different price scenarios in the Great Southern with the optimum stocking rate.

		May Lambing					July Lambing				
		High Meat	High Wool	Standard	Low Wool	Low Meat	High Meat	High Wool	Standard	Low Wool	Low Meat
Dry	Bag Lamb	167	152	145	138	122	184	170	159	145	131
	Export	164	149	141	136	119	185	170	157	145	132
	1st cross	243	212	205	198	168	-	-	-	-	-
Single	Bag Lamb	244	216	209	201	170	246	217	208	193	164
	Export	232	204	196	192	160	247	221	207	194	169
	1st cross	354	295	294	290	233	-	-	-	-	-
Twin	Bag Lamb	331	290	280	268	224	307	265	258	241	199
	Export	311	270	260	253	208	310	273	257	243	206
	1st cross	392	323	322	319	253	-	-	-	-	-

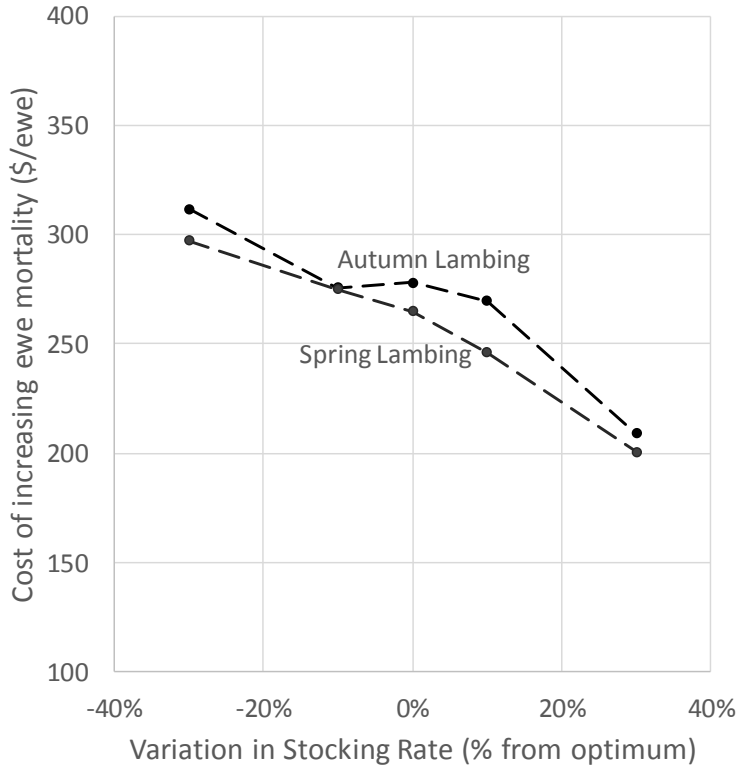

Figure 4: Comparison of the value of a twin ewe with different time of lambing for a flock in the Great Southern selling export hoggets.

May Lambing

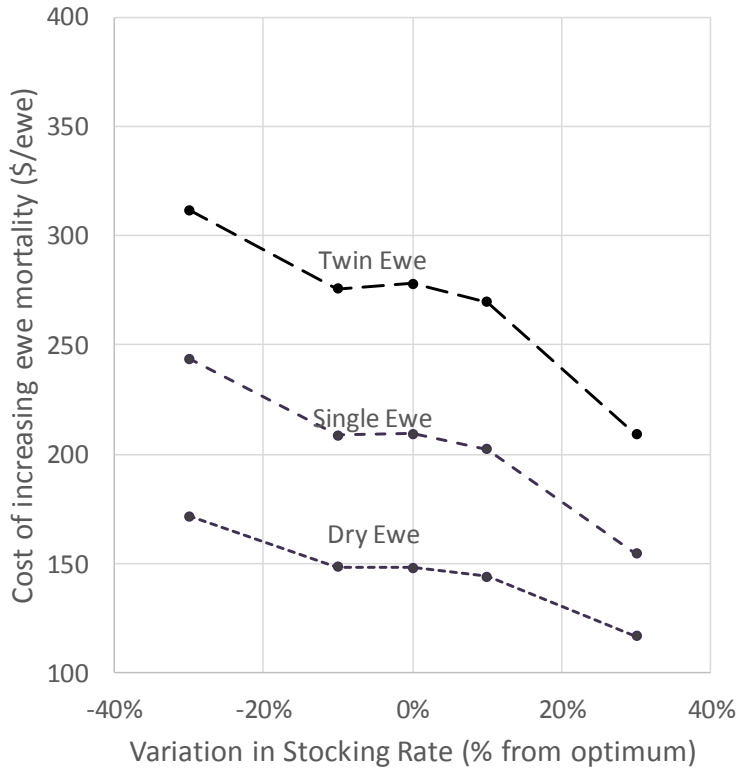

Figure 5: Comparison of the value of dry, single and twin ewes for a flock in the Great Southern lambing in May selling export hoggets.

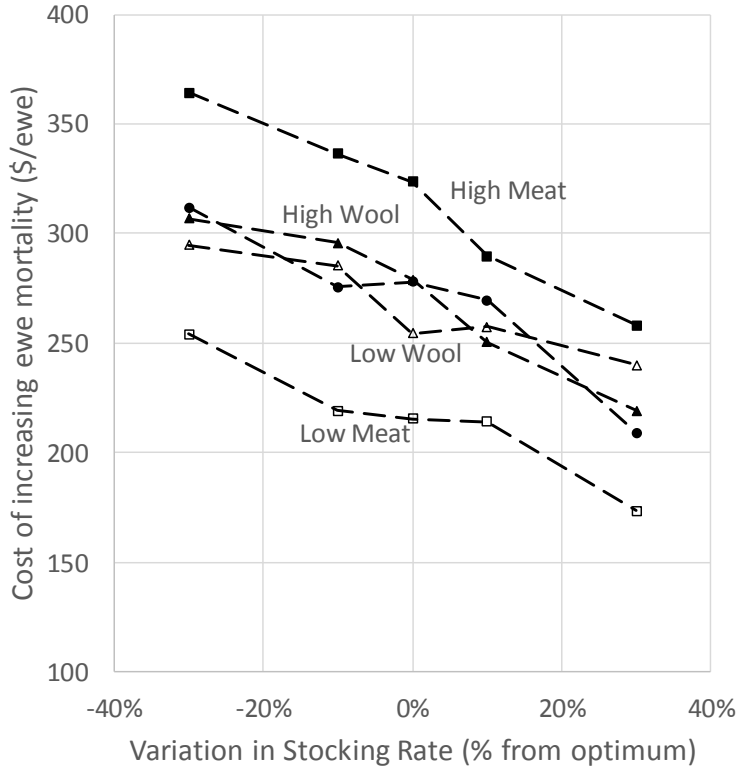

Figure 6: Comparison of the value of a twin ewe for a flock in the Great Southern lambing in May selling export hoggets and receiving a range of wool and meat prices.

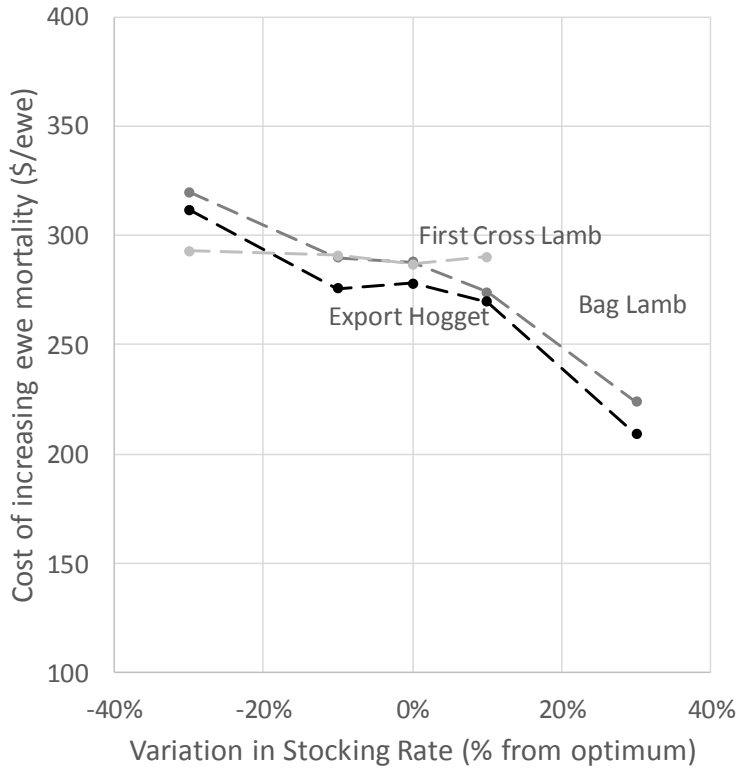

Figure 7: Comparison of the value of a twin ewe for a flock in the Great Southern lambing in May selling 'bag lamb', 'export hoggets' or 1st cross lambs.

July Lambing

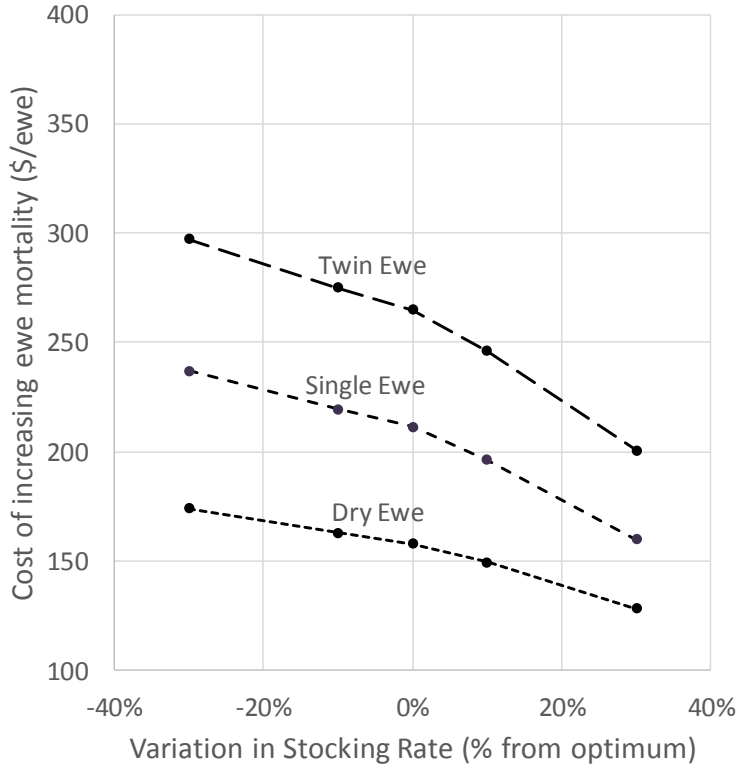

Figure 8: Comparison of the value of dry, single and twin ewes for a flock in the Great Southern lambing in July selling export hoggets.

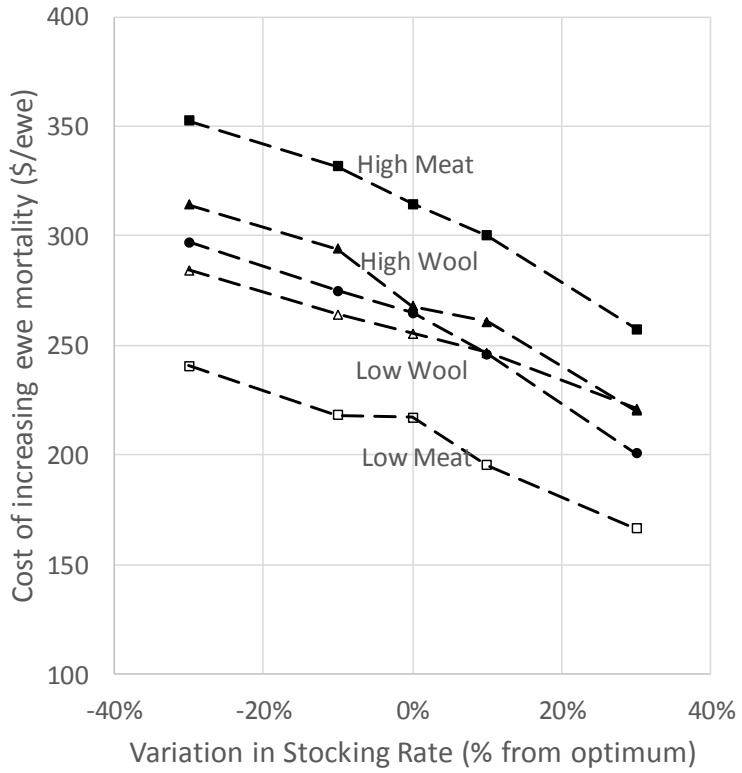

Figure 9: Comparison of the value of a twin ewe for a flock in the Great Southern lambing in July selling export hoggets and receiving a range of wool and meat prices.

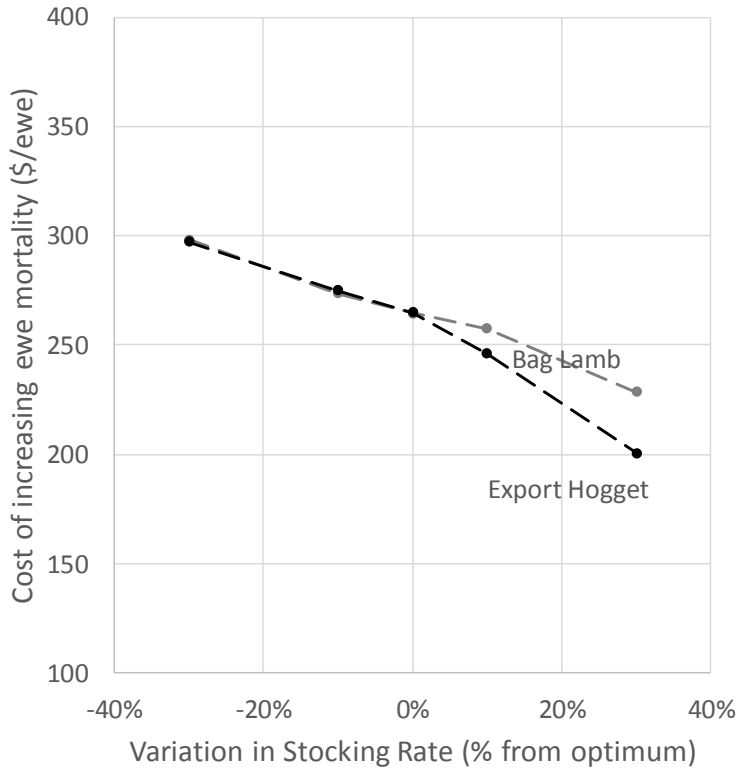

Figure 10: Comparison of the value of a twin ewe for a flock in the Great Southern lambing in July selling 'bag lamb', 'export hoggets' or 1st cross lambs.

Central Wheatbelt

Table 15: Value of an extra dry, single or twin ewe surviving for 5 different price scenarios in the Central Wheatbelt.

		May Lambing					July Lambing				
		High Meat	High Wool	Standard	Low Wool	Low Meat	High Meat	High Wool	Standard	Low Wool	Low Meat
Dry	Bag Lamb	192	174	163	150	134	193	178	166	155	139
	Export	190	174	161	147	132	194	179	167	154	139
	1st cross	232	208	200	190	164	-	-	-	-	-
Single	Bag Lamb	272	253	240	223	191	264	233	223	214	183
	Export	281	234	233	216	187	264	235	222	210	181
	1st cross	354	303	299	288	234	-	-	-	-	-
Twin	Bag Lamb	358	333	318	299	253	336	291	282	274	229
	Export	373	305	309	288	246	335	294	280	267	225
	1st cross	381	323	319	309	247	-	-	-	-	-

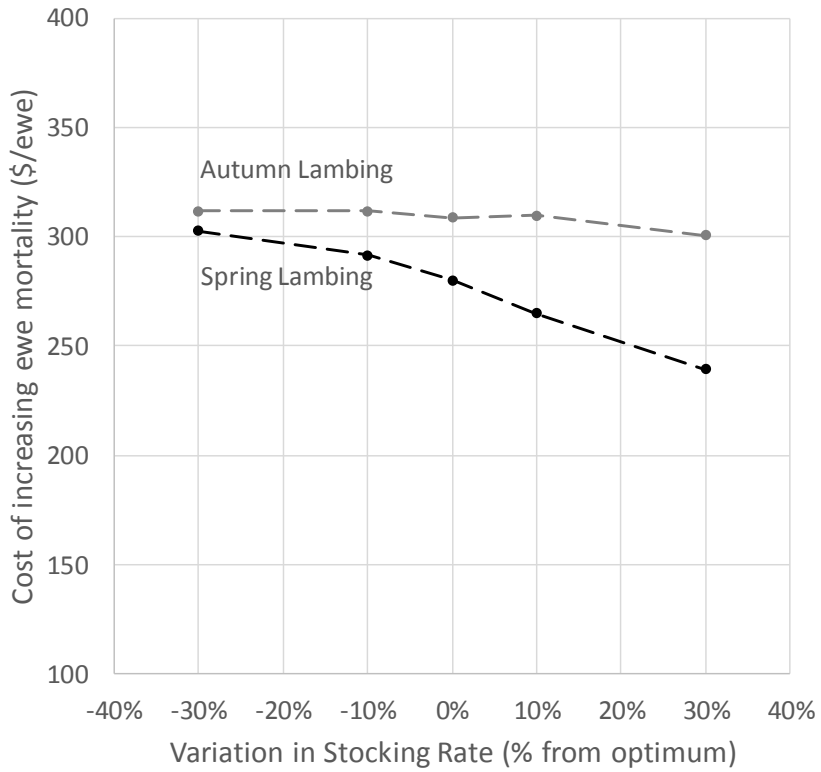

Figure 11: Comparison of the value of a twin ewe with different time of lambing for a flock in the Central wheatbelt selling export hoggets.

May Lambing

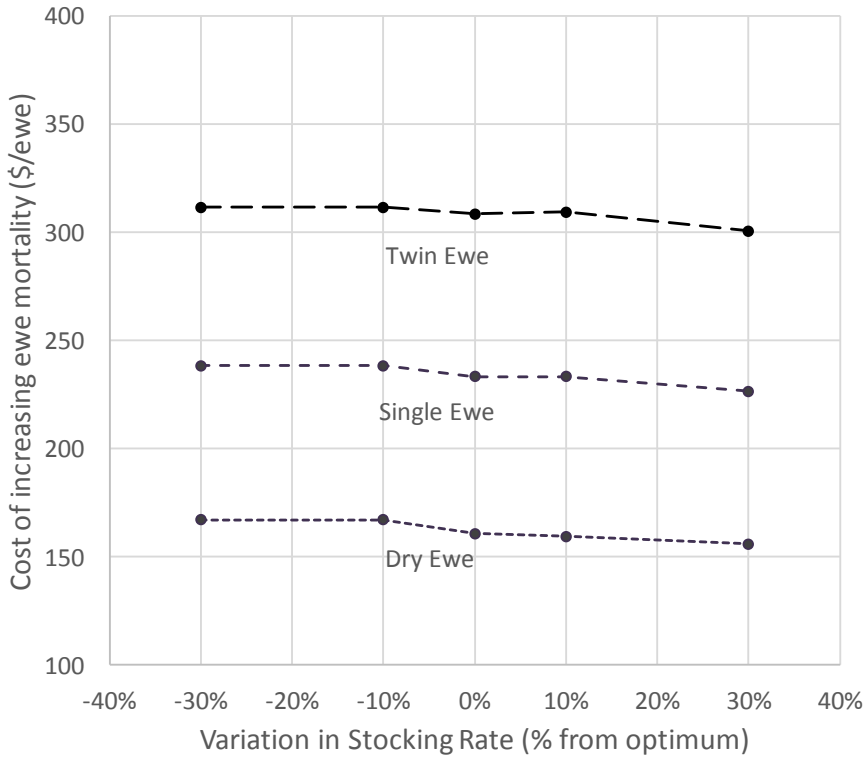

Figure 12: Comparison of the value of dry, single and twin ewes for a flock in the Central wheatbelt lambing in May selling export hoggets.

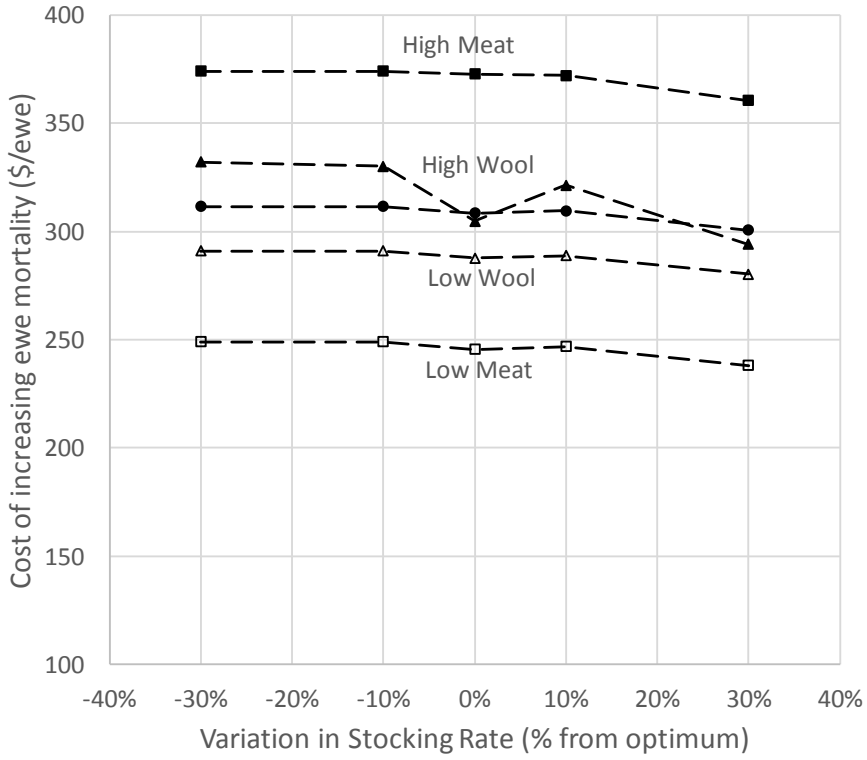

Figure 13: Comparison of the value of a twin ewe for a flock in the Central wheatbelt lambing in May selling export hoggets and receiving a range of wool and meat prices.

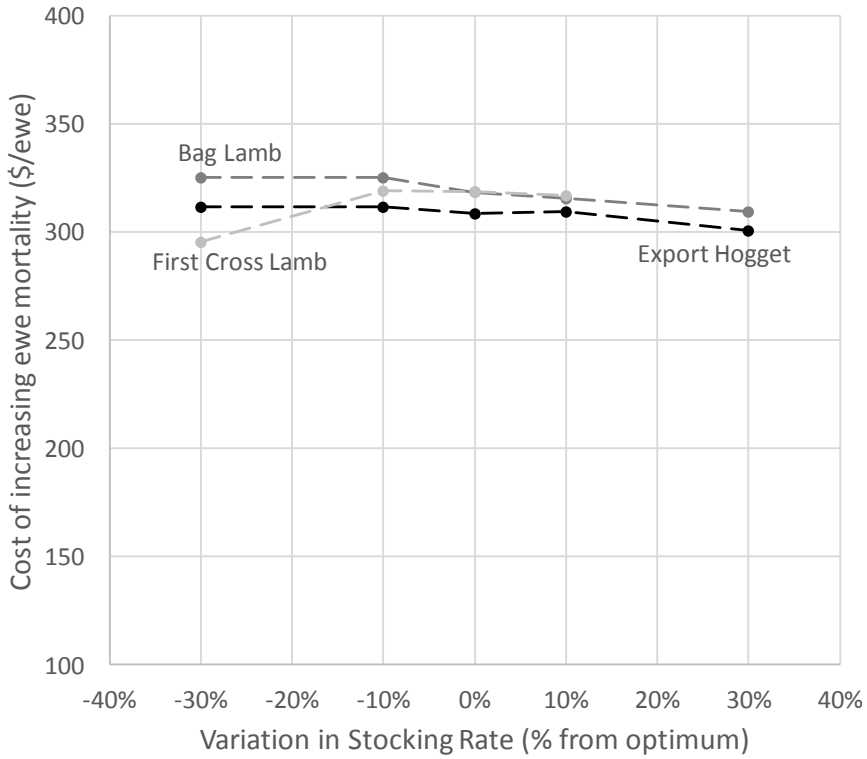

Figure 14: Comparison of the value of a twin ewe for a flock in the Central wheatbelt lambing in May selling 'bag lamb', 'export hoggets' or 1st cross lambs.

July Lambing

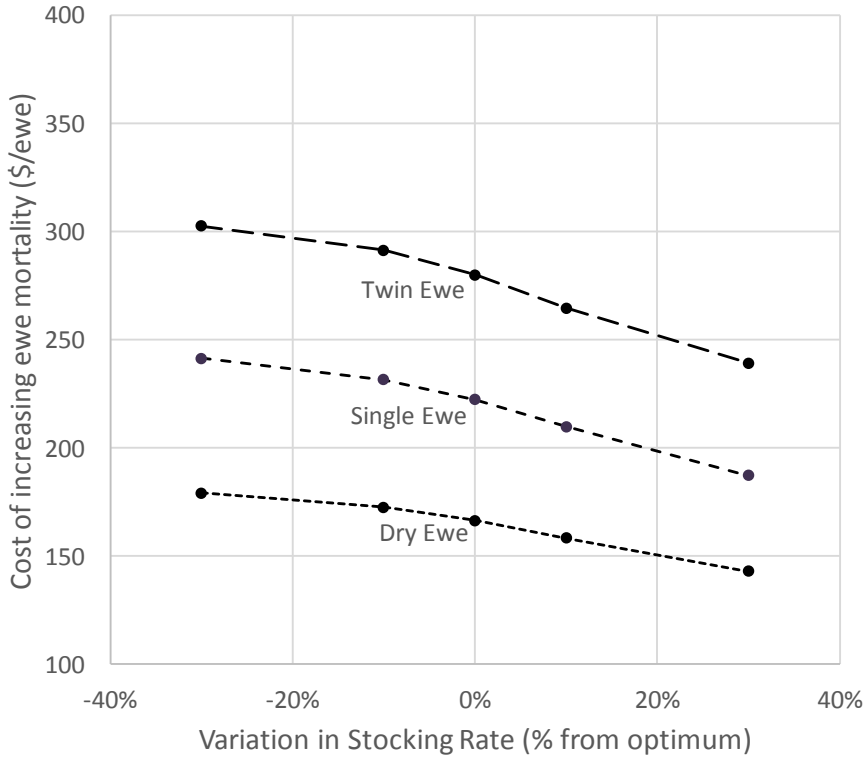

Figure 15: Comparison of the value of dry, single and twin ewes for a flock in the Central wheatbelt lambing in July selling export hoggets.

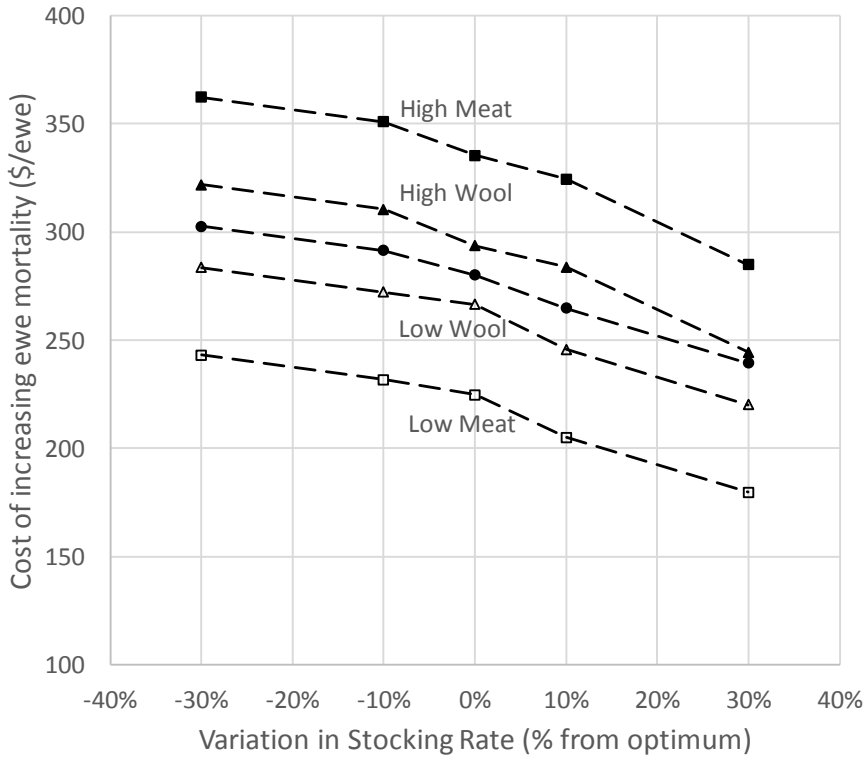

Figure 16: Comparison of the value of a twin ewe for a flock in the Central wheatbelt lambing in July selling export hoggets and receiving a range of wool and meat prices.

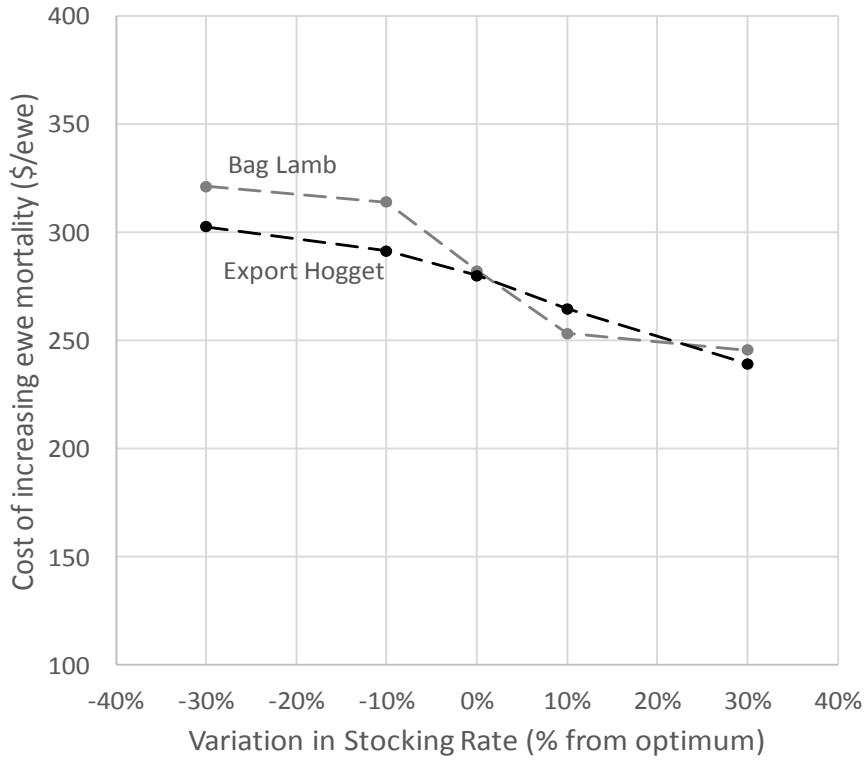

Figure 17: Comparison of the value of a twin ewe for a flock in the Central wheatbelt lambing in July selling 'bag lamb', 'export hoggets' or 1st cross lambs.